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| 09/875,474 | 06/06/2001 | Raul E. Sequeira | CE08236R | 7955 |
| 22917 | 7590 | 09/21/2006 | EXAMINER | |
| MOTOROLA, INC. 1303 EAST ALGONQUIN ROAD IL01/3RD SCHAUMBURG, IL 60196 | | | ODOM, CURTIS B | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2611 | |

DATE MAILED: 09/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|-----------------------------------|--|
| Office Action Summary | Application No. 09/875,474 | Applicant(s) SEQUEIRA, RAUL E. | |
| | Examiner Curtis B. Odom | Art Unit 2611 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7-9, 11, 12 and 14-16 is/are rejected.
- 7) ☒ Claim(s) 5, 6, 10, and 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 7/6/2006 have been fully considered but they are not persuasive. Applicant states on page 6 of the "REMARKS" the following: "Applicant respectfully submits that there is a difference between the approximation claimed by the present invention and the estimations cited in Divsalar. Estimation is for random variables one cannot measure but can estimate on statistics. Approximation, on the other hand, is for functions that simplify the computations where a value "close enough" suffices. However, "Merriam-Webster's Collegiate Dictionary" (Tenth Edition), page 396 defines "estimate" as the following: "to judge tentatively or **approximately** the value, worth, or significance of". Therefore, by definition, it is the understanding of the examiner that an estimation is in fact an approximation.

Regarding claim 1, Divsalar et al. does disclose the interference cancellation is a multi-stage operation. However, the characteristic (E_b/N_0) is estimated for each k th stage or iteration as apart of $I(k)$ shown in Equation 17. It is the understanding of the examiner that although Divsalar discloses a multi-stage operation, that E_b/N_0 is calculated for each individual k th stage of the operation.

Regarding claims 8 and 11, the Applicant states Divsalar et al. does not disclose "power control groups". However, there is no teaching or definition of what comprises a "power control group" is the specification. MPEP 2111.01 [R-3], Section I states the following:

“While the claims of issued patents are interpreted in light of the specification, prosecution history, prior art and other claims, this is not the mode of claim interpretation to be applied during examination. During examination, the claims must be interpreted as broadly as their terms reasonably allow. In re American Academy of Science Tech Center, **>367 F.3d 1359, 1369, 70 USPQ2d 1827, 1834 (Fed. Cir. 2004)< (The USPTO uses a different standard for construing claims than that used by district courts; during examination the USPTO must give claims their broadest reasonable interpretation.). This means that the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification. In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) (discussed below); Chef America, Inc. v. Lamb-Weston, Inc., 358 F.3d 1371, 1372, 69 USPQ2d 1857 (Fed. Cir. 2004).”

Thus, since there is no teaching or definition in the specification regarding “power control group”, the examiner has interpreted the term as broadly as the terms allow. Thus, it is the understanding of examiner that a power control group is referring to each user on the access channel.

Applicant's arguments with respect to claims 5-7, 9, 10, and 13 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Divsalar et al. (previously cited in Office Action 2/8/2006)

Regarding claim 1, Divsalar et al. discloses a method of interference cancellation in a multiple access communication channel comprising:

receiving (page 261, column 2, paragraph 2) a signal including at least a first data component (user 1 data, a_k) for a first channel within the multiple access communication channel and a second data component (multiuser interference) for a second channel within the multiple access communication channel on the communication channel;

determining a characteristic (Equation 9, E_b/N_0) of one k th stage of the multiple access communication channel;

estimating (page 262 Equation 9) an interference factor ($I(k) p_k$) in Equation 18 caused by the second data component $a_1(k-1)$ (see Equation 9) which is the soft data estimate of user data interference from the previous stage (see page 262, column 1) a received on the multiple access communication channel based upon the characteristic (Equations 9 and 14);

using (page 264, Equations 18 and 19, column 2, paragraphs 3 and 4) the interference factor ($I(k)p_k$) to cancel the second data component (multiuser interference) from the signal (see also page 264, column 2); and

recovering (page 264, Equations 18 and 19) the first data component (page 260, column 2, section III, and page 261, Equation 4, a_k) from the signal.

Regarding claim 2, which inherits the limitations of claim 1, Divsalar et al. discloses the interference factor ($I(k) p_k$) comprises one of a data estimate ($a_k(k-1)$) (see Equation 9) and a partial interference cancellation coefficient represented by p_k (page 264, column 2, paragraphs 3 and 4).

Regarding claim 3, which inherits the limitations of claim 1, Divsalar et al. discloses the signal comprises a spread spectrum code division multiple access system signal (Abstract).

Regarding claim 4, which inherits the limitations of claim 1, Divsalar et al. discloses the step of estimating comprises applying a joint probability distribution function to the characteristic as shown Equations 11-14 to obtain p_k .

Regarding claim 14, which inherits the limitations of claim 2, Divsalar et al. discloses the partial interference coefficient (Equations 12 and 14) is based on estimates of the received signal that involves the first data component (a_k) and a channel estimate (E_b/N_0).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 7-9, 11, 12, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Divsalar et al. (previously cited in Office Action 2/8/2006) in view of Kanterakis et al. (U.S. Patent No. 5, 757, 791).

Regarding claim 7 (see rejection of claim 1), Divsalar does not specifically disclose the ratio (E_b/N_0) is a signal-to-noise ratio estimation.

However, Kanterakis et al. also discloses a method of multi-user interference cancellation wherein E_b/N_0 represents a signal-to-noise ratio (column 15, lines 40-48). Therefore, it would have been obvious to one skilled in the art to use E_b/N_0 in Divsalar et al. as a representation of signal-to-noise ratio in order to calculate the correct interference (MMSE) coefficients and processing stages based on the signal-to-noise ratio (see Kanterakis et al., column 15, lines 48-51 and column 16, lines 55-60).

Regarding claim 8, Divsalar et al. discloses in a receiver (page 262, Fig. 3) including interference cancellation in a multiple access communication channel, the receiver adapted to receive a signal for the communication channel including a first data component (page 261, column 2, paragraph 2, user data) for a first channel within, the multiple access communication channel and a second data component (multiuser interference) for a second channel within the multiple access communication channel, a method of providing a data estimate comprising the steps of:

estimating (page 262, Equation 9) a ratio (E_b/N_0) for the signal;

applying a function (page 263 Equation 10) to the ratio to determine an approximation of the soft data estimate caused by the second data component ($a(k-1)$) received on the multiple access communication channel on a power control group (user) by power control group basis (user) for each of the first data component and the second data component; and

subtracting (page 264, Equation 18) from the aggregate received signal (Y) the signal estimate ($I(k)p_k$) involving soft data estimate (page 262, Equation 9, wherein $I(k)$ includes the soft data estimate ($a(k-1)$) of the second data component.

Divsalar et al. does not specifically disclose the ratio (E_b/N_o) is a signal-to-noise ratio.

However, Kanterakis et al. also discloses a method of multi-user interference cancellation wherein E_b/N_o represents a signal-to-noise ratio (column 15, lines 40-48). Therefore, it would have been obvious to one skilled in the art to use E_b/N_o in Divsalar et al. as a representation of signal-to-noise ratio in order to calculate the correct interference (MMSE) coefficients and processing stages based on the signal-to-noise ratio (see Kanterakis et al., column 15, lines 48-51 and column 16, lines 55-60).

Regarding claim 9, which inherits the limitations of claim 8, Divsalar et al. discloses the step of estimating a ratio comprises estimating a first signal term (E_b) and second signal term (N_o) (see Equation 9).

Regarding claim 11, Divsalar et al. discloses in a receiver (page 261, column 2, paragraph 2) including partial interference cancellation in a multiple access communication channel, the receiver adapted to receive a signal for the communication signal including a first data component for a first channel (desired user data) within the multiple access communication channel and a second data component for a second channel (multiuser interference) within the multiple access communication channel, a method of providing a partial interference cancellation coefficient comprising the steps of:

estimating (Equation 9) a first signal term (E_b) and a second signal term (N_o) of the signal;

applying a square root function to a ratio (see Equation 9) to determine an intermediate parameter (see page 262, Equation 9, $I(k)$) caused by the second data component (see page 262, Equation 9, $I(k)$) received on the communication channel on a power control group (user) by power control group (user) basis, wherein the a power control group is defined as each user;

using the intermediate parameter (Equation 14) to determine a partial interference cancellation coefficient (p_k).

Divsalar et al. does not specifically disclose the ratio (E_b/N_0) is a signal-to-noise ratio.

However, Kanterakis et al. also discloses a method of multi-user interference cancellation wherein E_b/N_0 represents a signal-to-noise ratio (column 15, lines 40-48). Therefore, it would have been obvious to one skilled in the art to use E_b/N_0 in Divsalar et al. as a representation of signal-to-noise ratio in order to calculate the correct interference (MMSE) coefficients and processing stages based on the signal-to-noise ratio (see Kanterakis et al., column 15, lines 48-51 and column 16, lines 55-60).

Regarding claim 12, which inherits the limitations of claim 11, Divsalar et al. discloses using the intermediate parameter to determine a second partial interference cancellation coefficient is determined for a plurality of given users (page 262, column 2).

Regarding claim 15, which inherits the limitations of claim 8, Divsalar et al. discloses the partial interference coefficient (Equations 12 and 14) is based on estimates of the received signal that involves the first data component (a_k) and a channel estimate (E_b/N_0).

Regarding claim 16, which inherits the limitations of claim 11, Divsalar et al. discloses the partial interference coefficient (Equations 12 and 14) is based on estimates of the received signal that involves the first data component (a_k) and a channel estimate (E_b/N_0).

Allowable Subject Matter

6. Claims 5, 6, 10, and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.


Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis B. Odom whose telephone number is 571-272-3046. The examiner can normally be reached on Monday- Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Curtis Odom
September 18, 2006